ISSN 1809-127X (online edition)
© 2010 Check List and Authors
Open Access | Freely available at *www.checklist.org.br*

Check List
Journal of species lists and distribution

LISTS OF SPECIES

Crustacea, Decapoda, Palaemonidae, *Macrobrachium* Bate, 1868, São Sebastião Island, state of São Paulo, southeastern Brazil

Emerson C. Mossolin, Leonardo G. Pileggi and Fernando L. Mantelatto *

Programa de Pós-Graduação em Biologia Comparada, Universidade de São Paulo, Faculdade de Filosofia, Ciências e Letras, Departamento de Biologia, Laboratório de Bioecologia e Sistemática de Crustáceos. Avenida Bandeirantes, 3900. CEP 14040-901. Ribeirão Preto, SP, Brasil.
* Corresponding author. E-mail: *flmantel@usp.br*

ABSTRACT: *Macrobrachium* is distributed globally in most biogeographical regions, and contains species with interesting mechanisms of evolution. We conducted an exhaustive survey on São Sebastião Island, the largest coastal island of the state of São Paulo. Here we provide a list of species (*M. acanthurus*, *M. carcinus*, *M. heterochirus*, *M. olfersi*, *M. potiuna*) together with the diagnosis, distribution, and remarks on each species, and a key for their identification. We compare our findings with available information on the genus. The high diversity of freshwater shrimps on the island is interesting in terms of biogeographical and evolutionary processes.

INTRODUCTION

Among the shrimp-like decapods, the infraorder Caridea is the largest group, with more than 3100 species (Fransen and De Grave 2009). This includes the numerically dominant genus *Macrobrachium* Bate, 1868, which is distributed globally in most biogeographical regions, with more than 240 named species (Wowor *et al.* 2009). Although its greatest diversity is found in the Indo-Pacific region, more than 55 species occur in the Americas, 17 of them in Brazil (Mantelatto *et al.* 2008; Pileggi and Mantelatto 2010).

In spite of previous efforts to assess the species diversity, the crustacean fauna of some islands remains imperfectly known, even for relatively well-studied decapod crustaceans. At least two factors explain this situation: the large number of islands and the inaccessibility of many of them, and the high diversity of the Crustacea in tropical and subtropical areas, as well as their great adaptability and varied life cycles, which sometimes make sampling difficult (Mantelatto and Garcia 2002).

In a continuation of the Brazilian research project on Systematics (PROTAX – MMA/CAPES/CNPq), and in accordance with recommendations of international environmental protection agencies, which encouraged surveys of species in preserved areas, we carried out a biodiversity study, involving the identification and taxonomic and biological traits of the fresh- and brackish-water decapods (Mossolin and Mantelatto 2008 and unpublished data) inhabiting São Sebastião Island on the northern coast of the state of São Paulo. This island, also called Ilhabela, is the largest and most populated island on the coast of São Paulo.

Shrimps of the genus *Macrobrachium* have been recorded from Ilhabela since the end of the 19th Century. Ihering (1897) found *Palaemon jamaicensis* (= *Macrobrachium carcinus*). Luederwaldt (1919) recorded *M. acanthurus*, *M. jamaicense* (= *M. carcinus*) and *M. olfersi*, and in 1929 the same author added *Palaemon paulensis* [currently considered a junior synonym of *Leander tenuicornis* (Say, 1818).

Little comprehensive published information on this island's crustacean fauna existed until our first study, with a survey of species and the distribution of the Trichodactylidae crabs (see Mossolin and Mantelatto 2008 for literature review). Here, we report on the freshwater shrimps of *Macrobrachium* from São Sebastião Island. We list the species and provide a brief morphological description, distributional data, and some remarks on each one, as well as a key for their identification. This information provides a basis for future comparative work with coastal regions and monitoring programs for the region, which is increasingly affected by tourism.

MATERIALS AND METHODS

The samples were taken in 2006 (July and September), 2007 (January, May, July), and 2008 (April), with sieves and traps, from sea level to rivers at about 200 m altitude, throughout São Sebastião Island. The sieve (55 cm diameter; 1 mm mesh diameter) was deployed along vegetated streambanks, for about 15 minutes. The traps were baited with animal feed and installed only in deeper areas, during the afternoon, and were withdrawn the next morning. The standard use for the traps was one night, and the number of traps was between 2 and 4, according to the river configuration. The geographical coordinates of all sampling sites were recorded with a GPS device.

In total, 65 sites were surveyed, of which 61 were on the west side and only four on the east side (Figure 1). The east side of the island can be reached only by a treacherous dirt road. The collecting effort was similar at all sites, and the number of individuals collected reflects the relative abundance of species. Some sites were near the sandy beaches, and were influenced by tides (in this study the salinity was not measured).

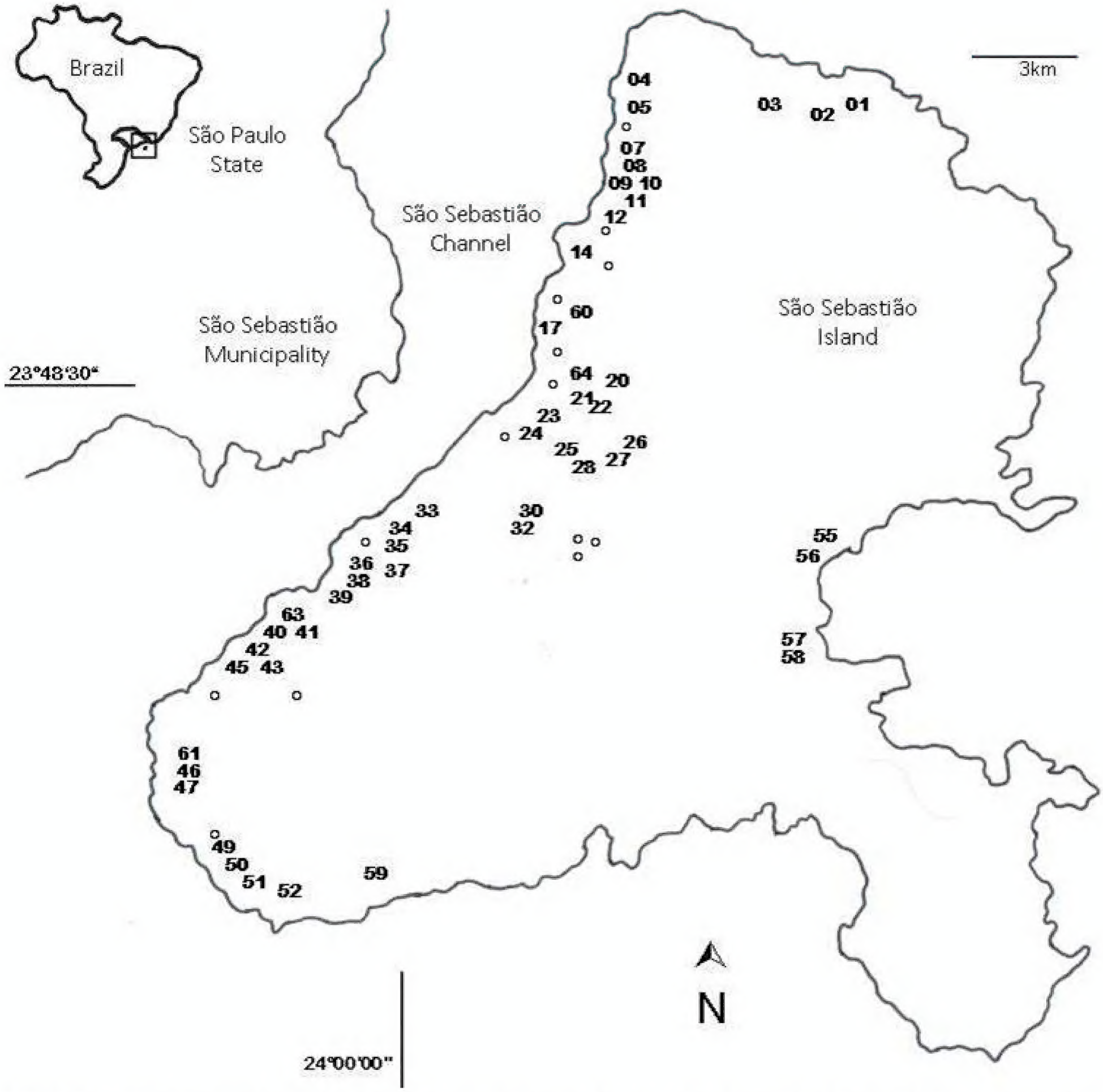

FIGURE 1. Map of São Sebastião Island, showing sampling sites where palaemonid shrimps were collected. The symbol "◦" indicates a sampling site where no shrimps were found.

For each species, we list the taxonomic traits (for adult males), number of sampling sites, geographical coordinates, date of sample, capture method (S = Sieve; T = Trap), number of individuals per sex, size range (including those individuals that were released and those fixed for collections), and name and number of the collection where they are deposited (MZUSP and CCDB). Some of the material was preserved in a personal collection (ECM) for use as teaching material.

In the field, the sex of each individual was checked, and they were divided into males (♂), non-ovigerous females (♀), ovigerous females (♀ ov.), and juveniles (juv.). Juveniles were identified to species level, but were not sexed because their small size made it difficult to observe the second pleopod. The carapace length (CL) (from the post-orbital margin to the dorsal posterior margin of the carapace) was measured with a digital caliper (0.01 mm precision).

After identification and measurement, the individuals were released in the same locality where they were caught, except those that were fixed in 80% ETOH for the reference collections. Voucher specimens are deposited in the following Crustacean Collections: Museum of Zoology of the University of São Paulo (MZUSP) and Faculty of Philosophy, Sciences and Letters of the Ribeirão Preto campus, University of São Paulo (CCDB). IBAMA and the Instituto Florestal supplied collecting permits (# 02027.000101/2006-10) for São Sebastião Island. The director of Ilhabela State Park and owners of private land authorized access to rivers.

RESULTS AND DISCUSSION

Shrimp species collected were *Macrobrachium acanthurus* (Wiegmann, 1836), *M. carcinus* (Linnaeus, 1758), *M. heterochirus* (Wiegmann, 1836), *M. olfersi* (Wiegmann, 1836), and *M. potiuna* (Müller, 1880).

These five freshwater shrimps constitute a diverse fauna compared to the 17 species reported on the Brazilian continent (Mantelatto *et al*. 2008; Pileggi and Mantelatto 2010). Eleven of these species are recorded from the state of São Paulo (Melo 2003).

Taxonomy

Palaemonidae Rafinesque, 1815
Palaemoninae Rafinesque, 1815
Macrobrachium Bate, 1868

Key to adult males of species of *Macrobrachium* from São Sebastião Island (Ilhabela), Brazil.

1. Rostrum with apex curved slightly upward. **2**
1'. Rostrum with apex straight or curved slightly downward. **3**

2. Rostrum with upper margin straight over the eye. ..... ***M. acanthurus***
2'. Rostrum with upper margin arched over the eyes. **4**

3. Second pair of pereiopods very unequal in shape and size. ..... ***M. olfersi***
3'. Second pair of pereiopods equal in shape and subequal in size. ..... ***M. potiuna***

4. Upper margin of the rostrum with 11 to 14 teeth; the first 4-6 teeth are located on the carapace, behind the orbit, and the first tooth is separated from the second by a greater distance than the others. ..... ***M. carcinus***

4'. Upper margin of the rostrum with 10 to 12 teeth; the first 4-5 teeth are placed on the carapace, behind the orbit, and the first 3-4 are more erect and more spaced than the others, which are regularly distributed on the margin. ..... ***M. heterochirus***

Macrobrachium acanthurus (Wiegmann, 1836) (Figure 2)

Palaemon acanthurus Wiegmann, 1836: 150.

Material collected and examined. Brazil, São Paulo, São Sebastião Island: Centro da Praia do Jabaquara (Site 1 on the map) (23°44'14.5" S, 045°17'31.2" W), 22.IX.2006, 3 ♂ (5.6 to 10.0 mm), 5 ♀ (5.0 to 13.5 mm) (S) (MZUSP 18281), 1 ♂ (10.9 mm), 2 ♀ (13.6 to 15.4 mm), 1 ♀ ov. (16.1 mm) (S) (CCDB 2169), 2 ♀ ov. (12.3 and 15.1 mm) (S) (ECM); Oeste da Praia do Jabaquara (Site 2) (23°44'12.6" S, 045°17'38.9" W), 22.IX.2006, 1 ♂ (22.9 mm) (T) (MZUSP 18280), 1 ♂ (23.0 mm) (T) (CCDB 2168), 1 ♂ (25.5 mm) (T) (ECM); Praia do Sino (Site 7) (23°44'54.1" S, 045°20'50.7" W), 20.IX.2006, 3 ♂ (5.2 to 8.3 mm), 1 ♀ (6.8 mm) (S) (MZUSP 18286); Praia da Siriúba (Site 9) (23°45'20.5" S, 045°20'57.5" W), 22.IX.2006, 3 ♂ (8.5 to 10.9 mm), 7 ♀ (7.8 to 11.6 mm), 2 juv. (4.5 and 6.3 mm) (S) (MZUSP 18287), 1 ♂ (12.9 mm), 3 ♀ (14.1 to 17.4 mm) (ECM), 01.IV.2008, 3 ♂ (21.4 to 25.1 mm), 2 ♀ (15.9 to 18.7 mm) (T) (MZUSP 18378), 5 ♂ (22.9 to 30.0 mm), 1 ♀ (16.5 mm) (T) (CCDB 2167), 4 ♂ (22.7 to 35.1 mm), 3 ♀ (16.3 to 19.0 mm) (T) (ECM); Praia do Barreiros (Site 12) (23°45'49.5" S, 045°20'55.4" W), 20.IX.2006, 12 ♂ (5.8 to 12.3 mm), 7 ♀ (5.6 to 10.0 mm), 3 juv. (4.8 to 4.8 mm) (S) (MZUSP 18352); Vila (Site 14) (23°46'35.1" S, 045°21'28.6" W), 21.IX.2006, 5 ♂ (5.6 to 13.7 mm), 2 ♀ (4.6 and 7.0 mm) (S) (MZUSP 18283); Praia do Itaquanduba (Site 17) (23°47'45.5" S, 045°21'50.8" W), 20.IX.2006, 1 ♀ (6.7 mm) (S) (MZUSP 18322); Baixo do Rio da Água Branca (Site 24) (23°49'17.5" S, 045°21'57.8" W), 10.I.2007, 2 ♂ (5.8 and 6.4 mm), 4 ♀ (8.6 to 11.7 mm), 1 juv. (4.9 mm) (S) (MZUSP 18304); Meio do Rio da Água Branca (Site 25) (23°49'23.2" S, 045°21'47.9" W), 18.VII.2006, 8 ♂ (6.7 to 12.1 mm), 1 ♀ (5.5 mm) (S) (MZUSP 18367), 1 ♂ (14.0 mm), 1 ♀ ov. (13.0 mm) (T) (MZUSP 18285), 1 ♂ (18.0 mm) (T) (released); Sul da Praia Grande (Site 39) (23°51'34.5" S, 045°25'03.5" W), 20.IX.2006, 5 ♂ (6.8 to 12.9 mm), 1 ♀ (9.2 mm), 1 juv. (4.2 mm) (S) (MZUSP 18284); Praia do Veloso (Site 42) (23°52'15.1" S, 045°26'07.3" W), 18.VII.2006, 2 ♂ (5.8 and 13.5 mm), 1 ♀ (9.0 mm) (S) (MZUSP 18282); Praia Vermelha (Site 58) (23°52'24.8" S, 045°17'29.4" W), 7.V.2007, 2 ♂ (8.3 and 8.4 mm) (S) (MZUSP 18363); Sul da Praia do Curral (Site 63) (23°52'07.6" S, 045°25'56.5" W), 19.VII.2007, 2 ♂ (6.8 and 9.9 mm), 1 ♀ (4.8 mm), 1 ♀ ov. (14.7 mm) (S) (MZUSP 18313); Alto da Praia do Perequê (Site 64) (23°48'32.8" S, 045°21'44.3" W), 19.VII.2007, 6 ♂ (5.7 to 8.5 mm), 7 ♀ (5.0 to 8.8 mm) (S) (MZUSP 18361).

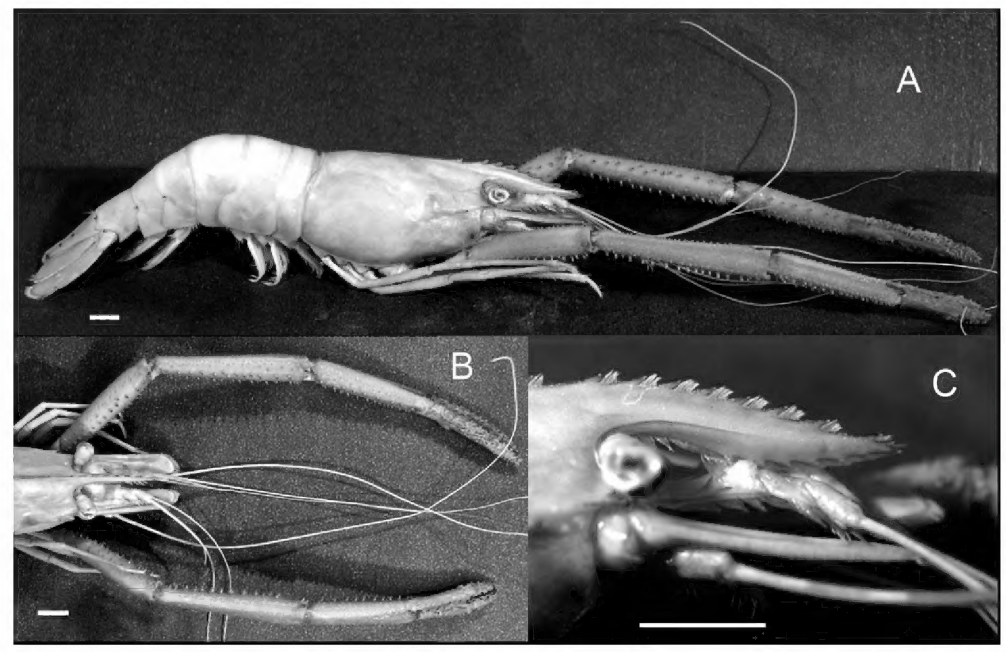

FIGURE 2. *Macrobrachium acanthurus* (Wiegmann, 1836) from São Sebastião Island, São Paulo, Brazil (CCDB 2167). A: Right lateral view; B: Anterior region in dorsal view; C: Rostrum in right lateral view. Scale bars = 5 mm.

Description. Rostrum nearly straight with apex curved slightly upward, reaching and in some cases exceeding scaphocerite, upper margin with 9 to 11 teeth, spaced regularly along rostrum, proximal teeth placed closer together than distal teeth. First two or three teeth located on carapace, behind the orbit; usually first and second teeth placed farther apart than are the second and third. Lower margin with 4 to 7 teeth, proximal teeth placed closer together than distal teeth. Carapace slightly roughened in antero-lateral region. Hepatic spine smaller than antennal spine and placed slightly obliquely behind the latter. First pair of pereiopods (P1), chelae and sometimes proximal portion of carpus extending past scaphocerite. Second pair of pereiopods (P2) equal or subequal in shape and size, with longitudinal rows of spines on all articles, reaching scaphocerite with carpus or part of merus. Ischium half as long as the merus. Merus 2/3 as long as carpus. Carpus half as long as fingers, gradually narrowing proximally. Propodus almost 2 times as long as dactylus. Palm elongate

and cylindrical, 5 times as long as high. Fingers thickly pubescent, slightly shorter than palm, closing over their whole length. Cutting edges with distinct tooth in proximal 1/4 and row of 3 or 4 denticles on each base of finger. Telson terminal margin ending in sharp median point flanked by two pairs of spinules, internal pair exceeding median point and external pair.

Female and undeveloped males. Distal tip of rostrum in females less bent upward than in males. Carapace smooth. Pereiopods 2 less developed, with weaker spinulation, reaching only to distal third of carpus beyond scaphocerite. Fingers without pubescent cover.

Size range (CL) observed in the island. Males: 5.2 to 35.1 mm. Females: 4.6 to 19.0 mm. Ovigerous females: 12.3 to 16.1 mm, with many small eggs. Juveniles: 4.2 to 6.3 mm.

Distribution. Coastal rivers of the United States of America, Mexico, Cuba, Haiti, Antilles, Santo Domingo, Puerto Rico, Nicaragua, Panama, Colombia, Venezuela, Surinam and Brazil (Pará, Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia, Espírito Santo, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul) (Melo, 2003).

Type locality. Brazilian coast.

Remarks. This species is most similar to *M. tenellum* (Smith, 1871) (a Pacific species) and *M. rathbunae* Holthuis, 1950. Of the Brazilian species, it is quite similar to *M. amazonicum* (Heller, 1862). The two can be distinguished by differences in the rostrum, which slopes more strongly upward in *M. amazonicum*, and in the shape of the P2, which is more slender in *M. amazonicum*. On São Sebastião Island the species is common in river mouths near the beach, but rarer in locations that are slightly higher in relation to sea level. None of the 14 sites where the species was observed is more than 20 m above sea level, or more than 500 m distant from the sea. At sites very close to the beach strand, *M. acanthurus* was not found together with any other species. Larger specimens were collected with sieves, but these individuals are easily captured using traps, in areas adjacent to the estuary.

Macrobrachium carcinus (Linnaeus, 1758) (Figure 3)
Cancer carcinus Linnaeus, 1758: 631.

Material collected and examined. Brazil, São Paulo, São Sebastião Island: Oeste da Praia do Jabaquara (Site 2 on the map) (23°44'12.6" S, 045°17'38.9" W), 22.IX.2006, 1 ♂ (28.5 mm) (T) (MZUSP 18273), 1 ♂ (33.3 mm) (T) (CCDB 2161), 1 ♂ (40.7 mm), 1 ♀ (36.5 mm) (T) (ECM); Estrada da Praia do Jabaquara (Site 3) (23°44'12.3" S, 045°18'19.4" W), 22.IX.2006, 1 ♂ (37.6 mm) (T) (MZUSP 18268), 1 ♂ (48.7 mm) (T) (CCDB 2162), 2 ♂ (34.0 and 38.1 mm) (T) (Released); Alto da Praia da Siriúba (Site 10) (23°45'25.2" S, 045°20'34.5" W), 21.IX.2006, 1 ♂ (35.0 mm) (T) (MZUSP 18277); Praia do Viana (Site 11) (23°45'38.4" S, 045°20'54.8" W), 22.IX.2006, 1 ♀ (36.0 mm) (S) (MZUSP 18275); Praia do Itaquanduba (Site 17) (23°47'45.5" S, 045°21'50.8" W), 20.IX.2006, 1 ♀ (48.8 mm) (T) (MZUSP 18269); Rio da Toca (Site 22) (23°49'08.3" S, 045°21'22.0" W), 13.VII.2006, 1 ♀ (53.0 mm) (S) (MZUSP 18375), 1 ♂ (48.1 mm) (S) (CCDB 2121); Tesouro da Colina (Site 32) (23°50'19.9" S, 045°22'25.0" W), 9.I.2007, 1 ♂ (35.0 mm) (T) (MZUSP 18271), 1 ♂ (66.3 mm) (T) (ECM); Campo do Portinho (Site 35) (23°50'53.6" S, 045°24'16.3" W), 13.VII.2006, 1 ♀ (33.0 mm) (T) (MZUSP 18279), 1 ♂ (32.8 mm) (ECM); Porto dos Frades (Site 50) (23°55'44.6" S, 45°26'33.5" W), 13.VII.2006, 1 ♂ (26.4 mm) (T) (MZUSP 18294); Marambaia (Site 52) (23°56'04.0" S, 045°25'51.9" W), 13.VII.2006, 1 ♀ (34.9 mm) (T) (MZUSP 18272), 1 ♂ (33.3 mm) (T) (CCDB 2163), 1 ♂ (40.5 mm) (T) (ECM); Praia Mansa (Site 57) (23°52'07.8" S, 045°17'28.1" W), 7.V.2007, 1 ♂ (40.4 mm) (S) (MZUSP 18276); Cachoeira da Laje (Site 59) (23°55'55.2" S, 045°24'32.7" W), 8.V.2007, 1 ♂ (43.8 mm) (S) (MZUSP 18274).

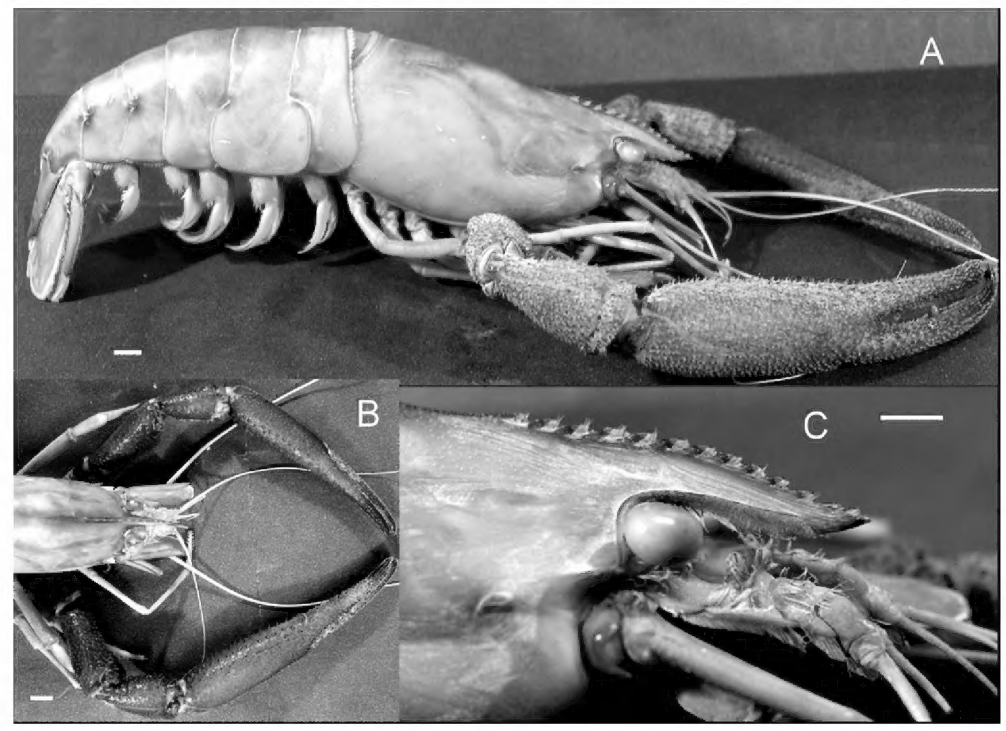

FIGURE 3. *Macrobrachium carcinus* (Linnaeus, 1758) from São Sebastião Island, São Paulo, Brazil (CCDB 2162). A: Right lateral view; B: Anterior region in dorsal view; C: Rostrum in right lateral view. Scale bars = 5 mm.

Description. Rostrum rather narrow with apex somewhat curved upward, and upper margin arched over eyes, reaching to or slightly beyond antennular peduncle. Upper margin with 11 to 14 teeth, regularly spaced along rostrum, and sometimes proximal teeth placed closer than distal teeth. First 4-6 teeth located on carapace, behind the orbit; distance between first and second teeth greater than that between second and third. Lower margin with 3 to 4 teeth. Carapace smooth or with roughened cavities on antero-lateral region. Hepatic spine smaller than antennal one and placed obliquely behind the latter. First pair of pereiopods, proximal third to half of carpus reaching scaphocerite. Second pair of pereiopods equal in shape and size, stronger and heavier than other pereiopods, with spines on all articles, reaching scaphocerite with midlength of carpus or with distal third of merus. Ischium half to 2/3 as long as merus. Merus about 1.5 times as long as carpus. Carpus half as long as palm, almost circular, gradually narrowing proximally. Propodus about 2 times as long as dactylus. Palm elongate and slightly compressed, 3 to 4 times as long as high. Fingers slightly shorter than palm, with distinct gap in proximal part. Cutting edges with distinct tooth; tooth of dactylus located at midlength and tooth of fixed finger close to upper tooth; a row of 2 to 5 denticles between these teeth and base of fingers. Cutting edges with brown pubescence. Telson terminal margin ending in sharp or truncated median point flanked by two pairs of spinules, inner pair not reaching median point in older specimens.

Female and undeveloped males. P2 less developed, with weaker spinulation, only distal third to half of carpus reaching beyond scaphocerite. Fingers almost closing over their whole length, without pubescence.

Size range (CL) observed on the island. Males: 26.4 to 66.3 mm. Females: 33.0 to 53.0 mm.

Distribution. Coastal rivers of the United States of America, Mexico, Cuba, Puerto Rico, Jamaica, Barbados, Antilles, Guatemala, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Guiana, Surinam, and Brazil (Pará, Pernambuco, Alagoas, Espírito Santo, Rio de Janeiro, São Paulo, Santa Catarina, and Rio Grande do Sul) (Melo, 2003).

Type locality. American rivers.

Remarks. This species is very close to *M. americanum*, a species from the Pacific coast. Recently, Pileggi and Mantelatto (2010), based on molecular aspects, have suggested that *M. americanum* may be a junior synonym of *M. carcinus*. With respect to the Brazilian species, it is similar to *M. heterochirus*, mainly in the shape of the rostrum and P2. The two species can be easily separated by the length of the rostrum, which in *M. heterochirus* reaches the end of the second or third article of the antennular peduncle, and in *M. carcinus* reaches to or slightly beyond the entire antennular peduncle. Another aspect of the rostrum that separates the species is that in *M. heterochirus* the first two proximal teeth are almost erect and the distance between them is greater than the distance from the next tooth, whereas in *M. carcinus* the first two teeth are not erect, and the distance between them is nearly equal to the distance from the next tooth. Large-sized animals were rarely captured with sieves (3 of 11 sites). At several sites it was impossible to evaluate the occurrence of the species, because of the difficulty of using the traps, which require a minimum water depth of 25 cm. In addition, some of these locations are frequently disturbed by human action, which prevents the traps from operating well. On this island, *M. carcinus* has been traditionally eaten by the local people, who catch them by hand in the shelters formed by rocks and tree trunks in the river. This species has certainly become less abundant, and especially large individuals have become rare in the last decade (E.C. Mossolin and personal communication with local residents). In populations of many species that are exploited by humans, larger individuals are more likely to be caught than smaller individuals, practices that can lead to a decline in the population, as we could observe on this island. Unfortunately, there are no data on the past demographic structure of this prawn for comparative analysis.

Macrobrachium heterochirus (Wiegmann, 1836) (Figure 4)

Palaemon heterochirus Wiegmann, 1836: 149.

Material collected and examined. Brazil, São Paulo, São Sebastião Island: Oeste da Praia do Jabaquara (Site 2 on the map) (23°44'12.6" S, 045°17'38.9" W), 22.IX.2006, 1 ♂ (25.2 mm) (S) (MZUSP 18292), 1 ♂ (22.1 mm), 1 ♀ (16.8 mm) (S) (ECM); Cachoeira da Toca (Site 26) (23°49'34.8" S, 045°20'30.3" W), 13.VII.2006, 1 ♂ (34.7 mm) (T) (MZUSP 18270), 1 ♂ (38.6 mm) (T) (CCDB 2158); Tesouro da Colina (Site 32) (23°50'19.9" S, 045°22'25.0" W), 9.I.2007, 1 ♀ ov. (26.6 mm) (T) (MZUSP 18319), 1 ♂ (36.5 mm) (T) (ECM); Alto da Praia do Curral (Site 41) (23°52'05.3" S, 045°25'30.9" W), 18.VII.2006, 1 ♀ (7.4 mm) (S) (MZUSP 18333); Castelhanos/Cachoeira do Engenho (Site 56) (23°51'03.2" S, 045°17'22.6" W), 7.V.2007, 1 ♀ (17.7 mm) (S) (MZUSP 18356); Cachoeira da Laje (Site 59) (23°55'55.2" S, 045°24'32.7" W), 8.V.2007, 1 ♂ (27.1 mm) (S) (MZUSP 18278); Taubaté (Site 61) (23°54'02.5" S, 045°27'28.0" W), 19.VII.2007, 1 ♂ (19.6 mm) (S) (MZUSP 18372).

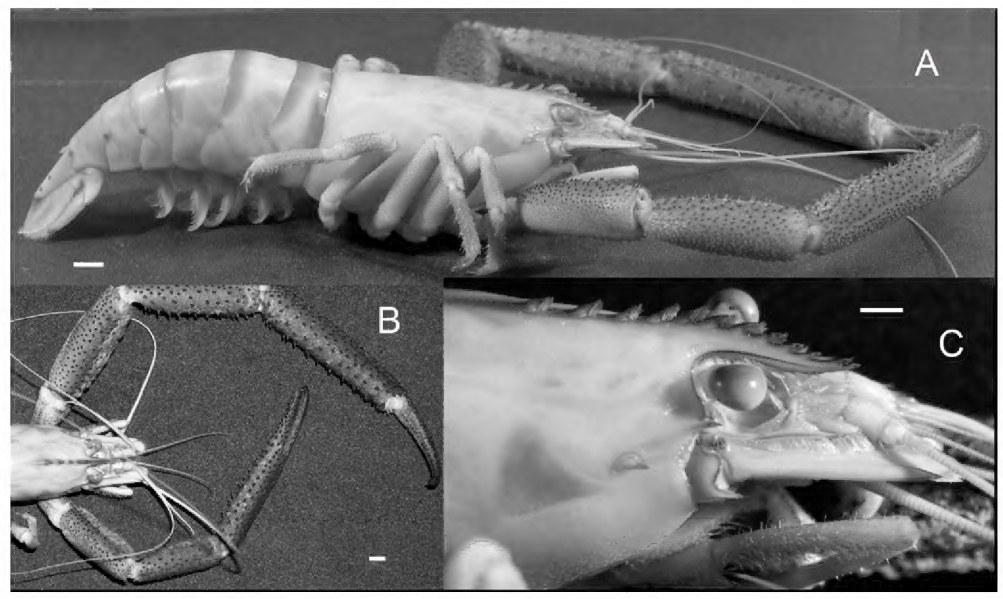

FIGURE 4. *Macrobrachium heterochirus* (Wiegmann, 1836) from São Sebastião Island, São Paulo, Brazil (CCDB 2158). A: Right lateral view; B: Anterior region in dorsal view; C: Rostrum in right lateral view. Scale bars = 5 mm.

Description. Rostrum straight and narrow with apex somewhat curved upward, upper margin arched over the eyes, reaching from end of second article to end of third antennular peduncle. Upper margin with 10 to 12 teeth. First 4 or 5 teeth located on carapace, behind the orbit; first tooth at 2/5 of the length of the carapace; first 3-4 teeth more erect and more spaced than the others, which are regularly distributed along the margin. Lower margin with 1 to 4 teeth. Carapace smooth. Hepatic spine smaller than antennal spine and placed obliquely behind the latter. First pair of pereiopods, proximal third to half of carpus reaching scaphocerite. Second pair of pereiopods equal in shape and unequal in size, stronger and heavier than other pereiopods, with spines on all articles, with half of carpus or half of merus reaching scaphocerite. Smaller P2, distal third of merus reaching scaphocerite. Ischium from 2/3 to equally as long as merus. Merus about 1.5 times as long as carpus. Carpus 3/4 as long as palm, almost circular, and gradually narrowing proximally. Propodus 2 to 2.5 times as long as dactylus. Palm elongate and slightly compressed, 4 times as long as high. Fingers closing over their entire length, crossing at apex. Cutting edges with row of 6 to 7 teeth, distal teeth stronger than proximal teeth; brown pubescence along cutting edges. Telson terminal margin ending in sharp or truncated median point flanked by two pairs of spinules; internal pair failing to reach median point in old specimens.

Female and undeveloped males. P2 less developed, equal in shape and size, with weak spinulation. Fingers without pubescence.

Size range (CL) observed on the island. Males: 19.6 to 38.6 mm. Females: 7.4 to 17.7 mm. Ovigerous female: 26.6 mm, with many small eggs.

Distribution. Coastal rivers of the United States of America, Mexico, Puerto Rico, Jamaica, Haiti, Santo Domingo, Antilles, Guatemala, Colombia, Venezuela, and Brazil (Rio Grande do Norte, Pernambuco, Espírito Santo, Rio de Janeiro, São Paulo, Santa Catarina, and Rio Grande do Sul) (Melo, 2003).

Type locality. East coast of Mexico.

Remarks. This species is very similar to *M. occidentale* Holthuis, 1950, a species from the Pacific coast. With respect to the Brazilian species, it is most similar to *M. carcinus*. The characters that distinguish the two species were mentioned in the section on *M. carcinus*. The main characteristic observed for this species on the island was the small size of the populations, noted at all 7 sites where it was found. In a collection effort of approximately 20 minutes using a sieve, in combination with the use of 4 traps at night, we never obtained more than 2 or 3 specimens. In contrast, an equal capture effort was sufficient to collect more than 100 specimens of *M. olfersi* at any site on the island.

Macrobrachium olfersi (Wiegmann, 1836) (Figure 5)
Palaemon olfersii Wiegmann, 1836: 150.

Material collected and examined. Brazil, São Paulo, São Sebastião Island: Oeste da Praia do Jabaquara (Site 2 on the map) (23°44'12.6" S, 045°17'38.9" W), 22.IX.2006, 1 ♂ (7.9 mm), 2 ♀ (9.6 and 9.9 mm) (S) (MZUSP 18329), 1 ♂ (8.9 mm), 2 ♀ (6.7 and 7.3 mm), 2 juv. (4.3 and 4.5 mm) (T) (MZUSP 18336); Estrada da Praia do Jabaquara (Site 3) (23°44'12.3" S, 045°18'19.4" W), 22.IX.2006, 5 ♂ (7.8 to 17.7 mm), 2 ♀ (5.4 and 5.9 mm) (S) (MZUSP 18302), 6 ♂ (10.3 to 19.8 mm), 2 ♀ (8.5 and 13.7 mm) (T) (MZUSP 18359); Ponta das Canas (Site 4) (23°43'42.8" S, 045°20'28.0" W), 22.IX.2006, 2 ♂ (9.5 and 11.8 mm), 3 ♀ (11.5 to 12.9 mm), 1 juv. (4.4 mm) (S) (MZUSP 18303); Praia da Armação (Site 5) (23°44'13.7" S, 045°20'36.2" W), 22.IX.2006, 1 ♂ (18.2 mm), 4 ♀ (12.0 to 15.6 mm), 1 ♀ ov. (11.5 mm), 1 juv. (4.4 mm) (S) (MZUSP 18355), 2 ♂ (16.4 and 19.0 mm), 3 ♀ ov. (11.9 to 15.7 mm) (S) (CCDB 2204); Alto da Praia do Sino (Site 8) (23°45'01.3" S, 045°20'41.4" W), 21.IX.2006, 11 ♂ (8.5 to 17.4 mm), 8 ♀ (6.5 to 13.0 mm), 1 juv. (4.3 mm) (S) (MZUSP 18360); Alto da Praia da Siriúba (Site 10) (23°45'25.2" S, 045°20'34.5" W), 21.IX.2006, 1 ♀ (12.3 mm) (S) (MZUSP 18297), 3 ♂ (8.2 to 21.6 mm), 2 ♀ (15.2 and 18.0 mm) (T) (MZUSP 18325), 3 ♂ (22.8 to 25.7 mm) (T) (ECM); Praia do Viana (Site 11) (23°45'38.4" S, 045°20'54.8" W), 22.IX.2006, 10 ♂ (4.8 to 9.1 mm), 8 ♀ (4.8 to 7.0 mm), 1 juv. (4.9 mm) (S) (MZUSP 18335); Praia do Itaquanduba (Site 17) (23°47'45.5" S, 045°21'50.8" W), 20.IX.2006, 1 ♂ (10.8 mm), 4 ♀ (11.0 to 15.2 mm), 3 ♀ ov. (15.0 to 16.7 mm) (S) (MZUSP 18321), 1 ♂ (17.3 mm), 2 ♀ (13.8 and 15.0 mm), 2 ♀ ov. (16.7 and 18.1 mm) (T) (MZUSP 18310), 2 ♂ (18.1 and 19.8 mm), 2 ♀ ov. (14.4 and 16.1 mm) (T) (ECM); Alto do Cocaia (Site 20) (23°48'35.4" S, 045°21'10.8" W), 10.I.2007, 3 ♂ (7.6 to 20.6 mm), 1 ♀ (14.0 mm) (S) (MZUSP 18338); Cocaia (Site 21) (23°49'01.7" S, 045°21'28.0" W), 17.VII.2006, 1 ♂ (7.4 mm), 1 ♀ (9.2 mm), 1 ♀ ov. (8.0 mm), 1 juv. (4.2 mm) (S) (MZUSP 18326), 2 ♂ (22.4 and 22.8 mm), 2 ♀ (5.9 and 10.5 mm), 4 ♀ ov. (9.7 to 16.3 mm) (T) (MZUSP 18324), 14 ♂ (12.7 to 19.3 mm), 13 ♀ (11.9 to 16.0 mm) (T) (Released); Rio da Toca (Site 22) (23°49'08.3" S, 045°21'22.0" W), 13.VII.2006, 8 ♀ (10.3 to 16.3 mm), 1 ♀ ov. (15.3 mm) (S) (MZUSP 18288), 2 ♂ (21.9 and 24.0 mm) (S) (ECM); Baixo da Cachoeira da Toca (Site 23) (23°49'31.8" S, 045°20'56.6" W), 13.VII.2006, 4 ♂ (19.3 to 22.8 mm), 2 ♀ (14.2 and 15.9 mm), 1 ♀ ov. (17.2 mm) (T) (MZUSP 18311), 4 ♂ (22.3 to 25.1 mm) (T) (ECM); Meio do Rio da Água Branca (Site 25) (23°49'23.2" S, 045°21'47.9" W), 18.VII.2006, 3 ♂ (6.9 to 13.3 mm), 3 ♀ (7.5 to 10.1 mm), 2 ♀ ov. (14.7 and 15.2 mm) (S) (MZUSP 18351); Cachoeira da Toca (Site 26) (23°49'34.8" S, 045°20'30.3" W), 13.VII.2006, 1 ♀ (12.3 mm) (S) (MZUSP 18306), 1 ♂ (25.3 mm), 1 ♀ (7.1 mm) (T) (MZUSP 18364), 2 ♂ (25.3 and 25.7 mm) (T) (CCDB 2201), 63 ♂ (9.1 to 27.2 mm), 4 ♀ (9.6 to 9.8 mm), 1 juv. (6.8 mm) (T) (Released); Green Park (Site 27) (23°49'41.8" S, 045°20'51.2" W), 9.I.2007, 2 ♂ (25.7 and 27.7 mm) (T) (MZUSP 18289); Baixo da Cachoeira da Água Branca (Site 28) (23°49'44.6" S, 045°21'32.1" W), 10.I.2007, 5 ♂ (4.8 to 11.5 mm), 7 ♀ (7.6 to 14.0 mm), 9 ♀ ov. (8.4 to 13.3 mm) (S) (MZUSP 18368); Cachoeira da Zabumba (Site 30) (23°50'08.1" S, 045°22'09.1" W), 10.I.2007, 15 ♂ (5.4 to 21.7 mm), 9 ♀ (5.6 to 13.2 mm), 3 ♀ ov. (11.3 to 13.6 mm) (S) (MZUSP 18369); Tesouro da Colina (Site 32) (23°50'19.9" S, 045°22'25.0" W), 9.I.2007, 3 ♂ (6.9 to 21.9 mm), 1 ♀ ov. (17.0 mm) (S) (MZUSP 18291), 1 ♂ (20.1 mm), 1 ♀ ov. (17.2 mm) (T) (MZUSP 18315), 1 ♂ (27.9 mm), 1 ♀ ov. (16.9 mm) (T) (CCDB 2203), 4 ♂ (22.9 to 25.6 mm), 7 ♀ (14.2 to 20.9 mm), (T) (Released); Ilhote (Site 33) (23°50'20.4" S, 045°23'55.1" W), 20.IX.2006, 2 ♀ (6.2 and 17.2 mm), 8 ♀ ov. (9.2 to 17.1 mm) (S) (MZUSP 18354); Praia do Portinho (Site 34) (23°50'42.8" S, 045°24'15.6" W), 17.VII.2006, 1 ♂ (17.8 mm), 1 ♀ (6.4 mm) (S) (MZUSP 18309); Campo do Portinho (Site 35) (23°50'53.6" S, 045°24'16.3" W), 13.VII.2006, 7 ♂ (5.5 to 21.1 mm), 23 ♀ (4.7 to 14.1 mm), 1 ♀ ov. (15.0 mm), 10 juv. (4.3 to 5.4 mm) (S) (MZUSP 18370), 18 ♂ (6.0 to 23.0 mm), 15 ♀ (11.9 to 17.0 mm) (T) (MZUSP 18350), 4 ♂ (18.6 to 20.9 mm) (T) (CCDB 2170), 3 ♂ (18.2 to 24.2 mm) (T) (ECM); Cachoeira Pancada D'Água (Site 36) (23°51'12.0" S, 045°24'25.8" W), 18.VII.2006, 17 ♂ (5.2 to 22.6 mm), 12 ♀ (5.2 to 13.1 mm) (S) (MZUSP 18371), 4 ♂ (7.4 to 23.2 mm) (T) (MZUSP 18353), 15 ♂ (9.1 to 24.6 mm), 2 ♀ (10.2 and 10.5 mm) (T) (Released); Cachoeira dos Três Tombos (Site 37) (23°51'17.6" S, 045°24'19.1" W), 18.VII.2006, 1 ♂ (16.5 mm), 3 ♀ (6.7 to 11.9 mm) (S) (MZUSP 18317); Norte da Praia Grande (Site 38) (23°51'23.0" S, 045°24'47.0" W), 2.I.2007, 5 ♂ (6.0 to 11.8 mm), 6 ♀ (5.8 to 9.3 mm), 1 juv. (4.7 mm) (S) (MZUSP 18316); Sul da Praia Grande (Site 39) (23°51'34.5" S, 045°25'03.5" W), 20.IX.2006, 3 ♂ (5.6 to 9.2 mm), 1 ♀ (13.2 mm), 4 ♀ ov. (10.1 to 12.9 mm), 1 juv. (5.6 mm) (S) (MZUSP 18320); Norte da Praia do Curral (Site 40) (23°51'49.0" S, 045°25'40.7" W), 20.IX.2006, 1 ♂ (17.1 mm) (S) (MZUSP 18376); Alto da Praia do Curral (Site 41) (23°52'05.3" S, 045°25'30.9" W), 18.VII.2006, 1 ♀ (6.1 mm) (S) (MZUSP 18332); Praia do Veloso (Site 42) (23°52'15.1" S, 045°26'07.3" W), 18.VII.2006, 2 ♂ (6.7 and 7.6 mm), 2 ♀ (6.2 and 15.0 mm), 1 ♀ ov. (13.7 mm) (S) (MZUSP 18299); Camping do Veloso (Site 43) (23°52'32.2" S, 045°26'09.7" W), 18.VII.2006, 1 ♂ (6.3 mm), 1 ♀ (15.1 mm) (S) (MZUSP 18301), 1 ♂ (24.2 mm), 2 ♀ (8.1 and 8.2 mm) (T) (MZUSP 18290), 3 ♂ (22.1 to 25.2 mm) (T) (CCDB

2202), 9 ♂ (17.4 to 25.6 mm), 1 ♀ (17.3 mm) (T) (Released); Cambaraú (Site 45) (23°52'31.9" S, 045°26'35.0" W), 24.VII.2006, 1 ♂ (16.8 mm), 3 ♀ ov. (10.0 to 17.0 mm) (S) (MZUSP 18296), 2 ♂ (18.0 and 18.1 mm), 9 ♀ (9.1 to 16.0 mm), 6 ♀ ov. (9.6 to 15.9 mm), 3 juv. (5.7 to 7.4 mm) (S) (Released); Rodamonte/Taubaté (Site 46) (23°53'55.4" S, 045°27'31.8" W), 24.VII.2006, 2 ♂ (5.8 and 8.2 mm), 5 ♀ ov. (11.5 to 15.9 mm), 5 juv. (3.8 to 5.0 mm) (S) (MZUSP 18307); Mexilhão (Site 47) (23°54'20.8" S, 045°27'26.3" W), 24.VII.2006, 6 ♂ (5.3 to 16.8 mm), 3 ♀ (7.2 to 9.2 mm), 5 juv. (3.8 to 4.5 mm) (S) (MZUSP 18362); Borrifos (Site 49) (23°55'16.0" S, 045°27'03.5" W), 14.VII.2006, 2 ♂ (6.7 and 17.1 mm), 3 ♀ (7.4 to 11.8 mm) (S) (MZUSP 18314); Porto dos Frades (Site 50) (23°55'44.6" S, 045°26'33.5" W), 13.VII.2006, 1 ♂ (6.2 mm), 1 ♀ (5.0 mm), 1 juv. (4.5 mm) (S) (MZUSP 18300), 2 ♂ (4.8 and 6.4 mm), 1 ♀ (5.6 mm) (T) (MZUSP 18327); Cachoeira da Vista (Site 51) (23°55'54.9" S, 045°26'26.0" W), 13.VII.2006, 2 ♂ (7.1 and 19.2 mm), 1 ♀ (6.7 mm), 3 juv. (4.9 to 6.3 mm) (T) (MZUSP 18318); Marambaia (Site 52) (23°56'04.0" S, 045°25'51.9" W), 13.VII.2006, 1 ♂ (5.7 mm), 1 ♀ (6.6 mm) (S) (MZUSP 18331), 10 ♂ (5.7 to 22.7 mm), 3 ♀ (6.0 to 10.1 mm) (T) (MZUSP 18323); Praia do Gato / Poço do Gordo (Site 55) (23°50'40.6" S, 045°17'04.0" W), 7.V.2007, 9 ♂ (5.2 to 14.1 mm), 3 ♀ (9.3 to 14.2 mm), 3 juv. (4.4 to 5.2 mm) (S) (MZUSP 18295); Castelhanos/Cachoeira do Engenho (Site 56) (23°51'03.2" S, 045°17'22.6" W), 7.V.2007, 6 ♂ (7.7 to 9.8 mm), 6 ♀ (6.9 to 12.1 mm), 1 ♀ ov. (12.2 mm), 3 juv. (4.5 to 5.7 mm) (S) (MZUSP 18305); Praia Mansa (Site 57) (23°52'07.8" S, 045°17'28.1" W), 7.V.2007, 5 ♂ (5.0 to 13.8 mm), 2 ♀ (5.6 and 10.1 mm), 1 juv. (4.8 mm) (S) (MZUSP 18357); Praia Vermelha (Site 58) (23°52'24.8" S, 045°17'29.4" W), 7.V.2007, 15 ♀ (6.8 to 13.3 mm), 2 ♀ ov. (12.6 and 14.7 mm), 2 juv. (3.7 and 4.0 mm) (S) (MZUSP 18328); Cachoeira da Laje (Site 59) (23°55'55.2" S, 045°24'32.7" W), 8.V.2007, 7 ♂ (5.8 to 7.2 mm), 1 juv. (4.5 mm) (S) (MZUSP 18349); Engenho D`Água I (Site 60) (23°47'40.8" S, 045°21'29.3" W), 6.V.2007, 5 ♂ (5.5 to 15.8 mm), 6 ♀ (5.5 to 12.1 mm), 11 juv. (4.0 to 5.2 mm) (S) (MZUSP 18366); Taubaté (Site 61) (23°54'02.5" S, 045°27'28.0" W), 19.VII.2007, 3 ♀ (7.9 to 13.7 mm), 2 juv. (4.2 and 4.4 mm) (S) (MZUSP 18293); Sul da Praia do Curral (Site 63) (23°52'07.6" S, 045°25'56.5" W), 19.VII.2007, 1 ♂ (6.2 mm), 2 ♀ ov. (14.4 and 14.8 mm), 1 juv. (5.7 mm) (S) (MZUSP 18312).

Description. Rostrum straight and narrow, sometimes bent slightly downward, reaching or overreaching end of antennular peduncle. Upper margin with 12 to 16 teeth regularly distributed along margin; first 3 to 6 teeth located on carapace, behind the orbit; first and second teeth farther apart than second and third. Lower margin with 2 to 4 teeth. Carapace smooth. Hepatic spine smaller than antennal spine, and placed obliquely behind the latter. First pair of pereiopods (P1), proximal third to half of carpus reaching scaphocerite. Second pair of pereiopods (P2) very unequal in shape and size, covered with conspicuous spines and long setae; in larger pereiopod, entire carpus and distal third of merus reaching beyond scaphocerite; in smaller periopod, proximal third of chela and half of carpus reaching scaphocerite. Ischium half to 2/3 as long as merus. Merus somewhat longer than carpus. Carpus 2/3 as long as palm, strongly inflated in anterior part. Propodus 2 times as long as dactylus. Palm slightly compressed and inflated, 1.5 to 2.5 times as long as wide. Fingers gaping when closed, thickly pubescent, with strong spines. Cutting edges with strong tooth in middle of margin and 3 to 5 teeth proximally; long rigid setae located from cutting edges toward inner part of gap. Telson, terminal margin ending in acute median point flanked by two pairs of spinules, inner pair reaching or exceeding end of median point.

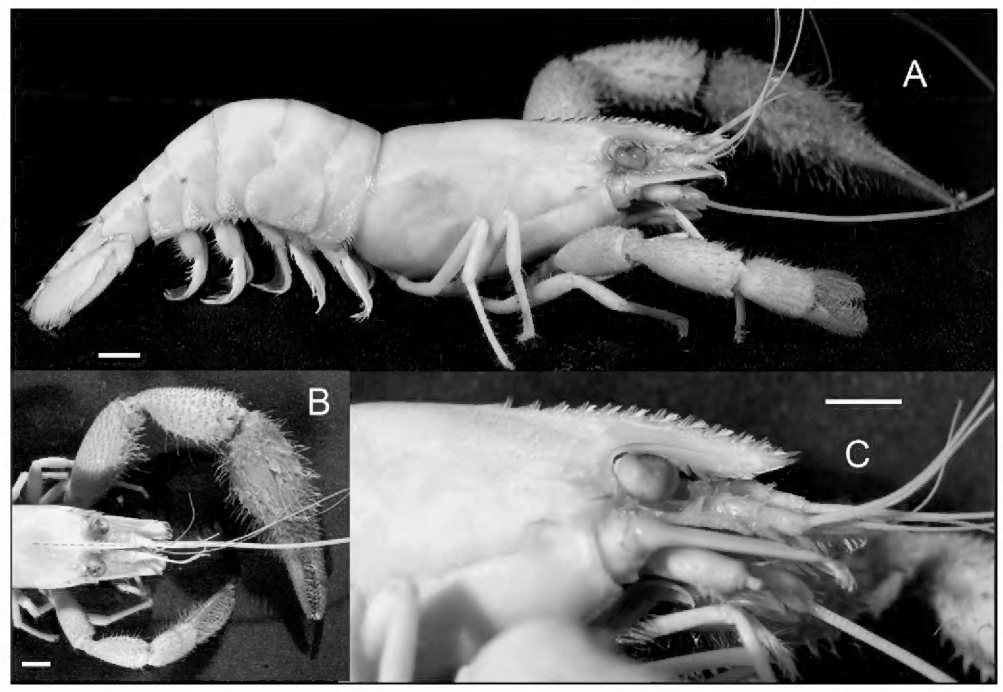

FIGURE 5. *Macrobrachium olfersi* (Wiegmann, 1836) from São Sebastião Island, São Paulo, Brazil (CCDB 2203). A: Right lateral view; B: Anterior region in dorsal view; C: Rostrum in right lateral view. Scale bars = 5 mm.

Female and undeveloped males. P2 less developed, more similar in shape and size, with weak spinulation. Fingers without pubescence, closing over their whole length. Cutting edges without distinct teeth, with some little-developed denticles.

Size range (CL) observed on the island. Males: 4.8 to 27.9 mm. Females: 4.7 to 20.9 mm. Ovigerous females: 8.0 to 18.1 mm, with many small eggs. Juveniles: 3.7 to 7.4 mm.

Distribution. Coastal rivers of the United States of America, Central America, Colombia, Venezuela, Guiana, Surinam, and Brazil (Pará, Piauí, Ceará, Rio Grande do Norte, Pernambuco, Alagoas, Sergipe, Bahia, Espírito Santo, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul) (Melo, 2003).

Type locality. Brazilian coast.

Remarks. This species is very similar to *M. faustinum* (de Saussure, 1857). On Ilhabela this is one of the most abundant species, collected at 44 sites, and many populations were very numerous. Another characteristic is the high incidence of ovigerous females, even during the coldest months of the year. This finding concords with studies of this species on the continent, which indicate a continuous reproductive period (Mossolin and Bueno 2002). It can be captured with relative ease by the use of sieves and traps.

In contrast to *M. potiuna* (discussed below), all other species have extended larval development (Lobão *et al.* 1985; Graziani *et al.* 1993; Anger and Moreira 1998), and pass part of their life in estuarine waters. Because the larvae remain in seawater for some time, they can be carried by ocean currents and colonize new environments. In

addition, the geological history of the region, the proximity to the mainland, and the isolation of the fauna on São Sebastião Island (see review in the discussion of Mossolin and Mantelatto 2008) support the presence of these well-established species on the island. According to Ihering (1897), on islands long separated from the continent, there is a tendency toward reduction of the fauna, since new individuals do not arrive from the mainland. In parallel, other groups may develop with great success because they do not encounter strong competition. According to Olmos (1996), the composition of island biotas depends on the combined effects of immigration and extinction, which are directly related to the size of an island and its degree of isolation.

Macrobrachium potiuna (Müller, 1880) (Figure 6)
Palaemon potiuna Müller, 1880: 152.

Material collected and examined. Brazil, São Paulo, São Sebastião Island: Alto do Cocaia (Site 20) (23°48'35.4" S, 045°21'10.8" W), 10.I.2007, 2 ♀ (6.4 and 6.8 mm), 4 ♀ ov. (7.4 to 8.7 mm) (S) (MZUSP 18337), 2 ♀ ov. (7.8 and 8.0 mm) (S) (CCDB 2164), 1 ♂ (7.7 mm), 2 ♀ ov. (8.6 and 10.3 mm) (S) (Released); Cachoeira da Toca (Site 26) (23°49'34.8" S, 045°20'30.3" W), 13.VII.2006, 18 ♂ (5.9 to 10.3 mm), 20 ♀ (6.1 to 10.8 mm), 1 juv. (5.1 mm) (T) (MZUSP 18365), 3 ♂ (8.7 to 9.9 mm), 1 ♀ (8.4 mm) (T) (CCDB 2166), 4 ♂ (10.0 to 12.6 mm), 1 ♀ (9.7 mm) (T) (ECM); Tesouro da Colina (Site 32) (23°50'19.9" S, 045°22'25.0" W), 9.I.2007, 13 ♂ (5.9 to 9.9 mm), 8 ♀ (6.2 to 9.2 mm), 9 ♀ ov. (7.9 to 8.6 mm) (S) (MZUSP 18298), 2 ♂ (7.1 and 9.9 mm), 3 ♀ ov. (7.9 to 9.3 mm) (S) (CCDB 2165), 3 ♂ (7.8 to 10.6 mm), 3 ♀ ov. (7.5 to 8.9 mm) (S) (ECM), 1 ♂ (7.2 mm) (T) (MZUSP 18334).

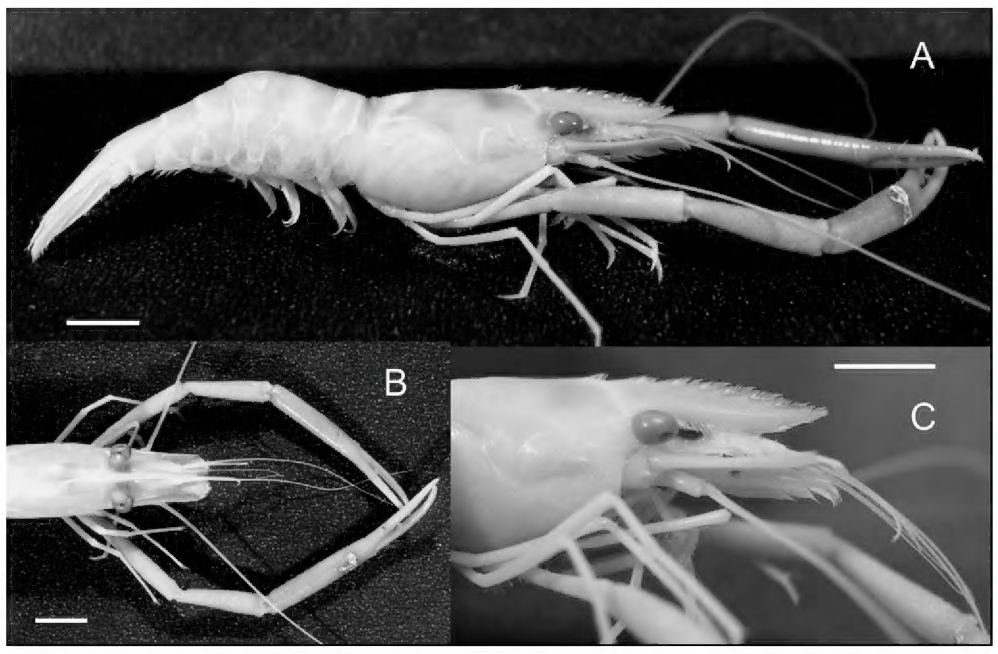

Figure 6. *Macrobrachium potiuna* (Müller, 1880) from São Sebastião Island, São Paulo, Brazil (CCDB 2165). A: Right lateral view; B: Anterior region in dorsal view; C: Rostrum in right lateral view. Scale bars = 5 mm.

Description. Rostrum straight and high, reaching or slightly exceeding end of antennular peduncle. Upper margin with 6 to 10 teeth regularly distributed along margin; first or first and second teeth located on carapace, behind the orbit. Lower margin with 1 to 3 teeth. Carapace roughened, mainly on antero-lateral part, by numerous spinules. Hepatic spine smaller than antennal spine and placed obliquely behind the latter. First pair of pereiopods, distal point of chelae reaching end of scaphocerite. Second pair of pereiopods equal in shape and somewhat unequal in size, entire carpus and distal third of merus reaching beyond scaphocerite; covered with spines on all articles. Ischium 2/3 to 3/4 as long as merus. Merus as long as carpus. Carpus 2/3 to 3/4 as long as palm. Propodus 2 times as long as dactylus. Palm elongated and slightly compressed. Fingers elongated, slender and slightly curved, with small gap. Cutting edges with 2 strong teeth on proximal part of dactylus and 1 tooth on fixed finger situated between two teeth of dactylus; denticles present between strong teeth and base of finger. Telson terminal margin ending in acute median point flanked by two pairs of spinules, inner pair exceeding end of median point.

Female and undeveloped males. Carapace smooth. P2 less developed and almost smooth. Fingers closing over their whole length. Cutting edges with teeth less developed.

Size range (CL) observed on the island. Males: 5.9 to 12.6 mm. Females: 6.1 to 10.8 mm. Ovigerous females: 7.4 to 10.3 mm, with few large eggs. Juvenile: 5.1 mm.

Distribution. Inland rivers of Brazil (Mato Grosso, Minas Gerais, Espírito Santo, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul) (Melo, 2003).

Type locality. Itajaí River, Blumenau, Santa Catarina, Brazil.

Remarks. This species was captured at only 3 sites. This limited distribution may be related to the type of larval development, which distinguishes it from all the other species on the island. *M. potiuna* does not depend on brackish water in any phase of its development, and bears a few large eggs, indicating that it has abbreviated larval development. In contrast, all the other species of shrimps captured on the island depend on brackish water in the larval phase, i.e., have extended larval development (Bueno and Rodrigues 1995). This is the first report of *M. potiuna* from the island.

General remarks – In our study, we expected to find all the species that were collected, with the exception of *M. potiuna*, which is considered a continental species and lives in river basins with no connection with the marine environment (Coelho and Ramos-Porto 1985). Although *M. potiuna* is a euryhaline species that survives in full-strength sea water for up to 6 h (Freire *et al.* 2003), it is physiologically independent of seawater in its life cycle (Müller and Carpes 1991; Lima and Oshiro 2000; Antunes and Oshiro 2004). The presence of *M. potiuna* on Ilhabela might result either from larvae drifting from nearby rivers of the continent and carried by the ocean currents, or because the species was already present in the area when it was part of the continent. As an exclusively freshwater species, populations on islands have great value for studies on biogeographical, ecological, and evolutionary processes of crustaceans and should be explored in the future, especially on the Brazilian islands.

The presence of juveniles and many ovigerous females detected during our survey is a good indication that all the species are relatively well established on the island. In general, for all the species, these reproductive aspects showed many similarities with the patterns of the same species inhabiting nearby areas in the continent. However,

a detailed comparative study on reproductive features involving species from island and continent areas is still necessary in order to enhance our knowledge of the mechanism and strategies underlying the reproductive process. Obviously, a comparative genetic study will provide more robust support for any further inferences.

At this time, our efforts to assess the species diversity have revealed that the freshwater decapod crustacean biota of São Sebastião Island is dominated by two main groups: 1) amphidromous, widespread caridean shrimps of the genera *Macrobrachium* (present study), *Atya*, and *Potimirim* (Mossolin *et al.* unpublished data); and 2) freshwater-associated (semiterrestrial, not amphidromous) island crabs of the genus *Trichodactylus* Latreille, 1828 (see Mossolin and Mantelatto 2008). Unfortunately, the insular crustacean fauna remains imperfectly known, and it is difficult to make comparisons of this fauna with those of other islands. The outcome of our efforts should encourage future studies in other, different biomes, not only to increase knowledge of the insular biodiversity but also to aid government institutions in establishing more-effective conservation policies to mitigate negative impacts on the natural populations.

Acknowledgments: We thank our colleagues from LBSC for their aid in field activities. This study forms part of a Postdoctoral project by ECM, and was supported by a fellowship from the Program of Qualification in Taxonomy - CAPES (# 563934/2005-0). LGP was supported by Doctoral and Post-Doctoral fellowships from FAPESP (05/50651-1) and CAPES (02630/09-5), respectively. Additional support for this project was provided to FLM by FAPESP (# 02/08178-9) and CNPq (# 472746/04-9, 471794/2006-6 and 473050/2007-2; Research Scholarships PQ # 301261/04-0; 301359/07-5). We gratefully acknowledge the Department of Biology and Postgraduate Program in Comparative Biology of the FFCLRP/USP for partial financial support, the CEBIMar/USP for logistical support during field and laboratory work, and Dr. Célio Magalhães and anonymous reviewers for their suggestions and comments. Dr. Janet Reid (JWR Associates, U.S.A.) revised the English text.

Literature Cited

Anger, K. and G.S. Moreira. 1998. Morphometric and reproductive traits of tropical caridean shrimps. *Journal of Crustacean Biology* 18(4): 823-838.

Antunes, L.S. and L.M.Y. Oshiro. 2004. Aspectos reprodutivos do camarão de água doce *Macrobrachium potiuna* (Müller) (Crustacea, Decapoda, Palaemonidae) na Serra do Piloto, Mangaratiba, Rio de Janeiro, Brasil. *Revista Brasileira de Zoologia* 21(2): 261-266.

Bueno, S.L.S. and S.A. Rodrigues. 1995. Abbreviated larval development of the freshwater prawn, *Macrobrachium iheringi* (Ortman, 1897) (Decapoda, Palaemonidae), reared in the laboratory. *Crustaceana* 68(6): 665-686.

Coelho, P.A. and M. Ramos-Porto. 1985. Camarões de água doce do Brasil: distribuição geográfica. *Revista Brasileira de Zoologia* 2(6): 405-410.

Fransen, C.H.J.M. and S. De Grave. 2009. Evolution and radiation of shrimp-like decapods: an overview; p. 245-259 *In* J.W. Martin, K.A. Crandall and D.L. Felder (ed.). *Decapod Crustacean Phylogenetics*. Boca Raton: Taylor and Francis/CRC Press, Crustacean Issues 18.

Freire, C.A., F. Cavassin, E.M. Rodrigues, A.H. Torres and J.C. McNamara. 2003. Adaptive patterns of osmotic and ionic regulation, and the invasion of fresh water by the palaemonid shrimps. *Comparative Biochemistry and Physiology A-Physiology* 136(3): 771-778.

Graziani, C.A., K.S. Chung and M.D. Donato. 1993. Comportamiento reproductivo y fertilidad de *Macrobrachium carcinus* (Decapoda: Palaemonidae) en Venezuela. *Revista de Biologia Tropical* 41(3): 657-665.

Ihering, H. Von. 1897. Os camarões de água doce do Brazil. *Revista do Museu Paulista* 2: 421-432.

Lima, E.A.C. and L.M.Y. Oshiro. 2000. Distribuição, abundância e biologia reprodutiva de *Macrobrachium potiuna* (Müller, 1880) (Crustacea, Decapoda, Palaemonidae) do rio Paraíba do Sul, RJ. *Acta Biologica Leopoldensia* 22(1): 67-77.

Lobão, V.L., W.C. Valenti and J.T.C. Mello. 1985. Fecundidade em *Macrobrachium carcinus* (L.) do Rio Ribeira de Iguape. *Boletim do Instituto de Pesca, São Paulo* 12(3): 1-8.

Luederwaldt, H. 1919. Lista dos crustáceos superiores (Thoracostraca) do Museu Paulista que foram encontrados no estado de São Paulo. *Revista do Museu Paulista* 11: 427-435.

Luederwaldt, H. 1929. Resultados de uma excursão scientifica á Ilha de São Sebastião no littoral do Estado de São Paulo em 1925. *Revista do Museu Paulista* 16: 1-74.

Mantelatto, F.L. and R.B. Garcia. 2002. Hermit crab fauna from the infralittoral zone of Anchieta Island (Ubatuba, Brazil); p. 137-143 *In* E.E. Escobar-Briones and F. Alvarez (ed.). *Modern Approaches to the Study of Crustacea*. New York: Kluwer Academic/Plenum Publishers.

Mantelatto, F.L., L.G. Pileggi, H. Suárez and C. Magalhães. 2008. First record and extension of the known distribution of the inland prawn, *Macrobrachium aracamuni* Rodríguez, 1982 (Decapoda, Palaemonidae) in Brazil. *Crustaceana* 81(2): 241-246.

Melo, G.A.S. 2003. Famílias Atyidae, Palaemonidae e Sergestidae; p. 289-415 *In* G.A.S. Melo (ed.). *Manual de Identificação dos Crustacea Decapoda de Água Doce do Brasil*. São Paulo: Edições Loyola, Centro Universitário São Camilo, Museu de Zoologia da Universidade de São Paulo.

Mossolin, E.C. and S.L.S. Bueno. 2002. Reproductive biology of *Macrobrachium olfersi* (Decapoda, Palaemonidae) in São Sebastião, Brazil. *Journal of Crustacean Biology* 22(2): 367-376.

Mossolin, E.C. and F.L. Mantelatto. 2008. Taxonomic and distributional results of a freshwater crab fauna survey (Family Trichodactylidae) on São Sebastião Island (Ilhabela), South Atlantic, Brazil. *Acta Limnologica Brasiliensia* 20(2): 125-129.

Müller, Y.M.R. and S. Carpes. 1991. *Macrobrachium potiuna* (Müller): aspectos do ciclo reprodutivo e sua relação com parâmetros ambientais (Crustacea, Decapoda, Palaemonidae). *Revista Brasileira de Zoologia* 8(1/2/3/4): 23-30.

Olmos, F. 1996. Missing species in São Sebastião Island, southeastern Brazil. *Papéis Avulsos de Zoologia* 39(18): 329-349.

Pileggi, L.G. and F.L. Mantelatto. 2010. Molecular phylogeny of the freshwater prawn genus *Macrobrachium* (Decapoda, Palaemonidae) with emphasis on the relationships among American species. *Invertebrate Systematics* 24(2): 194-208.

Wowor, D., V. Muthu, R. Meier, M. Balke, Y. Cai and P.K.L. Ng. 2009. Evolution of life history traits in Asian freshwater prawns of the genus *Macrobrachium* (Crustacea: Decapoda: Palaemonidae) based on multilocus molecular phylogenetic analysis. *Molecular Phylogenetics and Evolution* 52: 340-350.

Received: August 2010
Revised: November 2010
Accepted: November 2010
Published online: November 2010
Editorial responsibility: Luis E. Arruda Bezerra